CLAIMS

1. A reduction gear for a walking assistance system that, in order to assist walking movement by extending/bending a user's leg joint, reduces the speed of rotation of an input shaft (Si) driven by a motor (48) and transmits the rotation to an output shaft (So) connected to the leg joint, the reduction gear comprising:

the input shaft (Si), the output shaft (So), a first planetary gear mechanism (P_1), and a second planetary gear mechanism (P_2) disposed coaxially on an axis (L), the second planetary gear mechanism (P_2) being disposed so as to substantially overlap the radially outer side of the first planetary gear mechanism (P_1), the rotation of the input shaft (Si) being reduced in speed by the first planetary gear mechanism (P_1) and the second planetary gear mechanism (P_2) and transmitted to the output shaft (So);

the first planetary gear mechanism (P_1) comprising a first sun gear (ZS_1) provided on the input shaft (Si), a first ring gear (ZR_1) rotatably disposed so as to surround the outer periphery of the first sun gear (ZS_1), a plurality of first planetary gears (ZP_1) meshing simultaneously with the first sun gear (ZS_1) and the first ring gear (ZR_1), and a first carrier (C_1) rotatably supporting the first planetary gears (ZP_1), and;

the second planetary gear mechanism (P_2) comprising a second sun gear (ZS_2) provided on the outer periphery of the first ring gear (ZR_1), a second ring gear (ZR_2) disposed so as to surround the outer periphery of the second sun gear (ZS_2), a plurality of second planetary gears (ZP_2) meshing simultaneously with the second sun gear (ZS_2) and the second ring gear (ZR_2), and a second carrier (C_2) rotatably supporting the second planetary gears (ZP_2).

2. The reduction gear for the walking assistance system according to Claim 1, wherein the first carrier (C_1) of the first planetary gear mechanism (P_1) is fixed to a casing (41), the second ring gear (ZR_2) of the second planetary gear mechanism (P_2) is fixed to the casing (41), and the second carrier (C_2) of the second planetary gear mechanism (P_2) is connected to the output shaft (So).

3. The reduction gear for the walking assistance system according to Claim 2, wherein a third planetary gear mechanism (P_3) is disposed so as to be coaxial with and be stacked on the first planetary gear mechanism (P_1) and the second planetary gear mechanism (P_2) in the axis (L) direction, the third planetary gear mechanism (P_3) comprising a third sun gear (ZS_3) provided on the outer periphery of a central part of the second carrier (C_2) of the second planetary gear mechanism (P_2), a third ring gear (ZR_3) fixed to the casing and disposed so as to surround the outer periphery of the third sun gear (ZS_3), a plurality of third planetary gears (ZP_3) meshing simultaneously with the third sun gear (ZS_3) and the third ring gear (ZR_3), and a third carrier (C_3) rotatably supporting the third planetary gear (ZP_3) and connected to the output shaft (So).

4. A reduction gear for a walking assistance system that, in order to assist walking movement by extending/bending a user's leg joint, reduces the speed of rotation of an input shaft (Si) driven by a motor (48) and transmits the rotation to an output shaft (So) connected to the leg joint, the reduction gear comprising:

the input shaft (Si), the output shaft (So), a first planetary gear mechanism (P_1), a second planetary gear mechanism (P_2), and a third planetary gear mechanism (P_3) disposed coaxially on an axis (L), the second planetary gear mechanism (P_2) being disposed so as to substantially overlap

the radially outer side of the first planetary gear mechanism (P_1), the third planetary gear mechanism (P_3) being disposed so as to substantially overlap the radially outer side of the second planetary gear mechanism (P_2), the rotation of the input shaft (Si) being reduced in speed by the first planetary gear mechanism (P_1), the second planetary gear mechanism (P_2), and the third planetary gear mechanism (P_3) and transmitted to the output shaft (So);

the first planetary gear mechanism (P_1) comprising a first sun gear (ZS_1) provided on the input shaft (Si), a first ring gear (ZR_1) formed on the inner periphery of an inside ring member (55i) rotatably disposed so as to surround the first sun gear (ZS_1), a plurality of first planetary gears (ZP_1) meshing simultaneously with the first sun gear (ZS_1) and the first ring gear (ZR_1), and a first carrier (C_1) fixed to a casing (41) and rotatably supporting the first planetary gears (ZP_1);

the second planetary gear mechanism (P_2) comprising a second sun gear (ZS_2) formed on the outer periphery of the inside ring member (55i), a second ring gear (ZR_2) formed on the inner periphery of an outside ring member (55o) disposed so as to surround the outer periphery of the second sun gear (ZS_2), a plurality of second planetary gears (ZP_2) meshing simultaneously with the second sun gear (ZS_2) and the second ring gear (ZR_2), and a second carrier (C_2) fixed to the casing (41) and rotatably supporting the second planetary gears (ZP_2); and

the third planetary gear mechanism (P_3) comprising a third sun gear (ZS_3) formed on the outer periphery of the outside ring member (55o), a third ring gear (ZR_3) fixed to the casing (41) so as to surround the outer periphery of the third sun gear (ZS_3), a plurality of third planetary gears (ZP_3) meshing simultaneously with the third sun gear (ZS_3) and the third ring gear (ZR_3), and

a third carrier (C_3) rotatably supporting the third planetary gears (ZP_3) and connected to the output shaft (So).

5. A reduction gear for a walking assistance system that, in order to assist walking movement by extending/bending a user's leg joint, reduces the speed of rotation of an input shaft (Si) driven by a motor (48) and transmits the rotation to an output shaft (So) connected to the leg joint, the reduction gear comprising:

the input shaft (Si), the output shaft (So), a first planetary gear mechanism (P_1), a second planetary gear mechanism (P_2), and a third planetary gear mechanism (P_3) disposed coaxially on an axis (L), the second planetary gear mechanism (P_2) being disposed so as to substantially overlap the radially outer side of the first planetary gear mechanism (P_1), the third planetary gear mechanism (P_3) being disposed so as to substantially overlap the radially outer side of the second planetary gear mechanism (P_2), the rotation of the input shaft (Si) being reduced in speed by the first planetary gear mechanism (P_1), the second planetary gear mechanism (P_2), and the third planetary gear mechanism (P_3) and transmitted to the output shaft (So);

the first planetary gear mechanism (P_1) comprising a first sun gear (ZS_1) provided on the input shaft (Si), a first ring gear (ZR_1) fixed to a casing (41) so as to surround the first sun gear (ZS_1), a plurality of first planetary gears (ZP_1) meshing simultaneously with the first sun gear (ZS_1) and the first ring gear (ZR_1), and a first carrier (C_1) rotatably supporting the first planetary gears (ZP_1);

the second planetary gear mechanism (P_2) comprising a second sun gear (ZS_2) formed on the outer periphery of the first carrier (C_1), a second ring gear (ZR_2) fixed to the casing (41) so as to surround the outer periphery of the second sun gear (ZS_2), a plurality of second planetary gears (ZP_2) meshing

simultaneously with the second sun gear (ZS_2) and the second ring gear (ZR_2), and a second carrier (C_2) rotatably supporting the second planetary gears (ZP_2); and

the third planetary gear mechanism (P_3) comprising a third sun gear (ZS_3) formed on the outer periphery of the second carrier (C_2), a third ring gear (ZR_3) fixed to the casing (41) so as to surround the outer periphery of the third sun gear (ZS_3), a plurality of third planetary gears (ZP_3) meshing simultaneously with the third sun gear (ZS_3) and the third ring gear (ZR_3), and a third carrier (C_3) rotatably supporting the third planetary gears (ZP_3) and connected to the output shaft (So).

6. A reduction gear for a walking assistance system that, in order to assist walking movement by extending/bending a user's leg joint, reduces the speed of rotation of an input shaft (Si) driven by a motor (48) and transmits the rotation to an output shaft (So) connected to the leg joint, the reduction gear comprising:

the input shaft (Si), the output shaft (So), a first planetary gear mechanism (P_1), a second planetary gear mechanism (P_2), and a third planetary gear mechanism (P_3) disposed coaxially on an axis (L), the second planetary gear mechanism (P_2) being disposed so as to substantially overlap the radially outer side of the first planetary gear mechanism (P_1), the third planetary gear mechanism (P_3) being disposed so as to be stacked on the first planetary gear mechanism (P_1) and the second planetary gear mechanism (P_2) in the axis (L) direction, the rotation of the input shaft (Si) being reduced in speed by the first planetary gear mechanism (P_1), the second planetary gear mechanism (P_2), and the third planetary gear mechanism (P_3) and transmitted to the output shaft (So);

the first planetary gear mechanism (P_1) comprising a first sun gear (ZS_1) provided on the input shaft (Si), a first ring gear (ZR_1) fixed to a casing (41) so as to surround the outer periphery of the first sun gear (ZS_1), a plurality of first planetary gears (ZP_1) meshing simultaneously with the first sun gear (ZS_1) and the first ring gear (ZR_1), and a first carrier (C_1) rotatably supporting the first planetary gears (ZP_1);

the second planetary gear mechanism (P_2) comprising a second sun gear (ZS_2) provided on the outer periphery of the first carrier (C_1), a second ring gear (ZR_2) fixed to the casing (41) so as to surround the outer periphery of the second sun gear (ZS_2), a plurality of second planetary gears (ZP_2) meshing simultaneously with the second sun gear (ZS_2) and the second ring gear (ZR_2), and a second carrier (C_2) rotatably supporting the second planetary gears (ZP_2); and

the third planetary gear mechanism (P_3) comprising a third sun gear (ZS_3) provided on the outer periphery of a central part of the second carrier (C_2), a third ring gear (ZR_3) fixed to the casing (41) so as to surround the outer periphery of the third sun gear (ZS_3), a plurality of third planetary gears (ZP_3) meshing simultaneously with the third sun gear (ZS_3) and the third ring gear (ZR_3), and a third carrier (C_3) rotatably supporting the third planetary gears (ZP_3) and connected to the output shaft (So).